

- Q1
Cond
- (i) A is a bridging group containing a Group 13-15 element;
 - (ii) each E is independently a Group 15 or 16 element covalently bonded to M;
 - (iii) each R is independently a C₁-C₃₀ radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, or halocarbyl-substituted organometalloid;
 - (iv) m and n are independently 1 or 2; and
 - (v) p is the charge on the bidentate ligand such that the overall charge of LMX_r is neutral;
 - (c) each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; a neutral hydrocarbyl-containing donor ligand; a univalent anionic ligand; a neutral non-hydrocarbyl atom containing donor ligand; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from about 2 to about 20 carbon atoms; or two Xs are joined to form an anionic chelating ligand; and
 - (d) r is 1, 2 or 3;
 - II) an activator ~~compound~~; and
 - III) a solid support wherein said transition metal compound ~~connected to said bidentate ligand~~ is immobilized on said support, where the transition metal loading is less than 100 micromoles transition metal per gram of solid support.

Claims 14-16 are cancelled.

17. (Currently Amended) The catalyst system of claims ~~1, 6, or~~ 13 wherein said activator comprises an alkylalumoxane, a modified alkylalumoxane, an aluminum alkyl, an aluminum alkyl halide, an aluminum halide, an ionizing anion precursor compound and or a noncoordinating anion precursor.
18. (Currently Amended) The catalyst system of claim 13 where the transition metal loading is from 10 to 80 micromoles transition metal per gram of solid support. ~~17~~
~~wherein the noncoordinating anion precursor comprises tetrakis(perfluorophenyl)boron.~~
19. (Currently Amended) The catalyst system of claim 13 where the transition metal loading is from 20 to 80 micromoles transition metal per gram of solid support. ~~1 or 6~~
~~wherein the activator comprises a halide salt of Group ~~13-16~~ metals or metalloids.~~
20. (Currently Amended) The catalyst system of claim 13 where the transition metal loading is from 40 to 60 micromoles transition metal per gram of solid support. ~~18~~
~~wherein the catalyst precursor to noncoordinating anion precursor molar ratio is from 10:1 to 1:10.~~

Claims 21 to 29 cancelled.

30. (Previously Presented) The catalyst system of claim 17 wherein LMX₄ has a square planar geometry.

Claims 31 -32 cancelled.

33. (Currently Amended) The catalyst system of claim 17 wherein the solid support comprises silica.
34. Cancelled

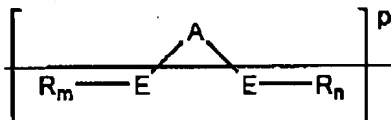
35. (Currently Amended) The catalyst system of claim 17 wherein ~~the metal M of the catalyst precursor~~ is a first row transition metal.
36. (Currently Amended) The catalyst system of claim 17 wherein ~~the bridging group A of the bidentate ligand~~ comprises at least one conjugated group.
37. Cancelled.
38. Cancelled.
39. (Currently Amended) The catalyst of claim 17 wherein the activator comprises an alumoxane and the transition metal compound-catalyst precursor-to-alumoxane molar ratio is from 1:500 to 10:1.
40. (Currently Amended) The catalyst system of claim ~~17~~ 13 wherein the M is Ni.
41. (Currently Amended) The catalyst system of claim ~~1, 6, or~~ 13, wherein the activator comprises methylalumoxane and/or modified methylalumoxane.
42. (Currently Amended) The catalyst system of claim ~~13~~ 19, wherein the activator comprises a non-coordinating anion precursor and the a total transition metal compound to noncoordinating anion precursor mole ratio is from 10:1 to 1:10.
43. (Currently Amended) The catalyst system of claim 13 wherein the activator comprises a non-coordinating anion. A catalyst composition comprising:
(1) a transition metal compound represented by the formula:
$$LMX_2$$

wherein
M is a group 9, 10 or 11 transition metal;
each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; a

~~univalent anionic ligand; a neutral hydrocarbyl-containing donor ligand; a neutral non-hydrocarbyl atom-containing donor ligand; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from 2 to 20 carbon atoms; or two Xs are joined to form an anionic chelating ligand; and~~

~~r is 1, 2 or 3;~~

~~L is a bidentate ligand defined by the formula:~~



~~wherein:~~

~~A is a bridging group containing a Group 13-15 element;~~

~~each E is independently a Group 15 or 16 element covalently bonded to M;~~

~~each R is independently a C₁-C₂₀ radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, or halocarbyl-substituted organometalloid,~~

~~m and n are independently 1 or 2 depending on the valency of E;~~

~~p is the charge on the bidentate ligand such that the overall charge of LMX₂ is neutral;~~

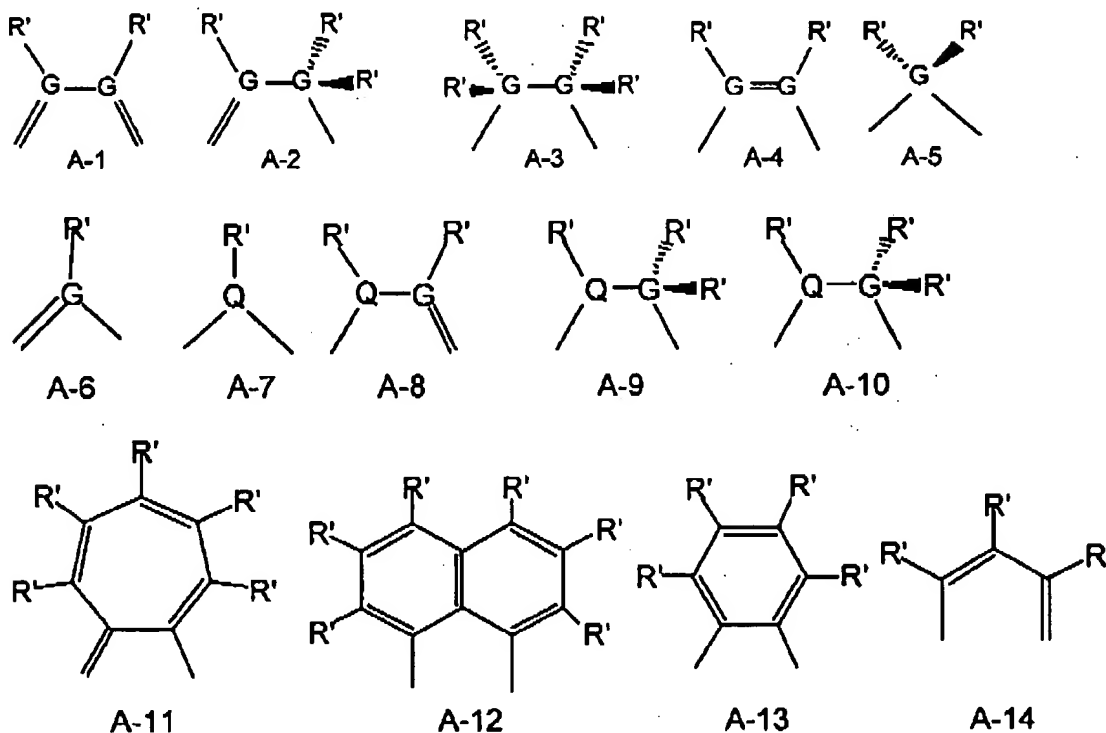
~~(2) an activator comprising one or more non-coordinating precursors; and~~

~~(3) a solid support.~~

44. (Previously Presented) The catalyst system of claim 43 wherein M comprises one or more of Ni, Pd, Pt, Cu, or Co.
45. (Currently Amended) The catalyst system of claim ~~44~~ 43 wherein the transition metal compound-to-noncoordinating-anion molar ratio is from 10:1 to 1:10.
46. (Previously Presented) The catalyst system of claim 43 wherein A has at least one conjugated group.
47. (Currently Amended) The catalyst system of claim 43 wherein the transition metal is present on the support at less than ~~100~~ 80 micromoles transition metal per gram of solid support.

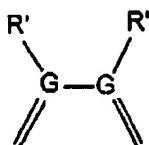
48. (Previously Presented) The catalyst system of claim 43 wherein M is nickel.

49. (Currently Amended) The catalyst ~~compound~~ system of claim 43 wherein A is defined by the following formulae:



wherein G is a Group 14 element ~~especially~~; Q is a Group 13 element; and R' are independently hydride radicals, C₁-C₃₀ hydrocarbyl radicals, substituted hydrocarbyl radicals, halocarbyl radicals, substituted halocarbyl radicals, ~~and~~ or hydrocarbyl- ~~and~~ or halocarbyl-substituted organometalloid radicals, and optionally two or more adjacent R' ~~may~~ form one or more C₄ to C₄₀ rings to give a saturated or unsaturated cyclic or polycyclic ring.

50. (Currently Amended) The catalyst system ~~compound~~ of claim 43 wherein M is nickel, E is nitrogen, m is 1, n is 1, p is 0, A is defined by the formula:



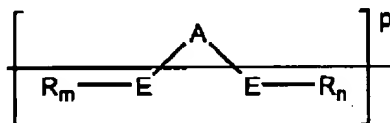
where each G is, independently, C, Si, or Ge, and each R' is a substituted phenyl group.

51. (Currently Amended) The catalyst system of claim 13 wherein the activator comprises an alumoxane. ~~A catalyst composition comprising the combination of a transition metal compound, an alumoxane and a support wherein the transition metal compound has the formula:~~



wherein

- ~~M is a group 9, 10 or 11 transition metal;~~
~~each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; a univalent anionic ligand; a neutral hydrocarbyl containing donor ligand; a neutral non-hydrocarbyl atom containing donor ligand; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from 2 to 20 carbon atoms; or two Xs are joined to form an anionic chelating ligand; and~~
~~r is 1, 2 or 3;~~
~~L is a bidentate ligand defined by the formula:~~

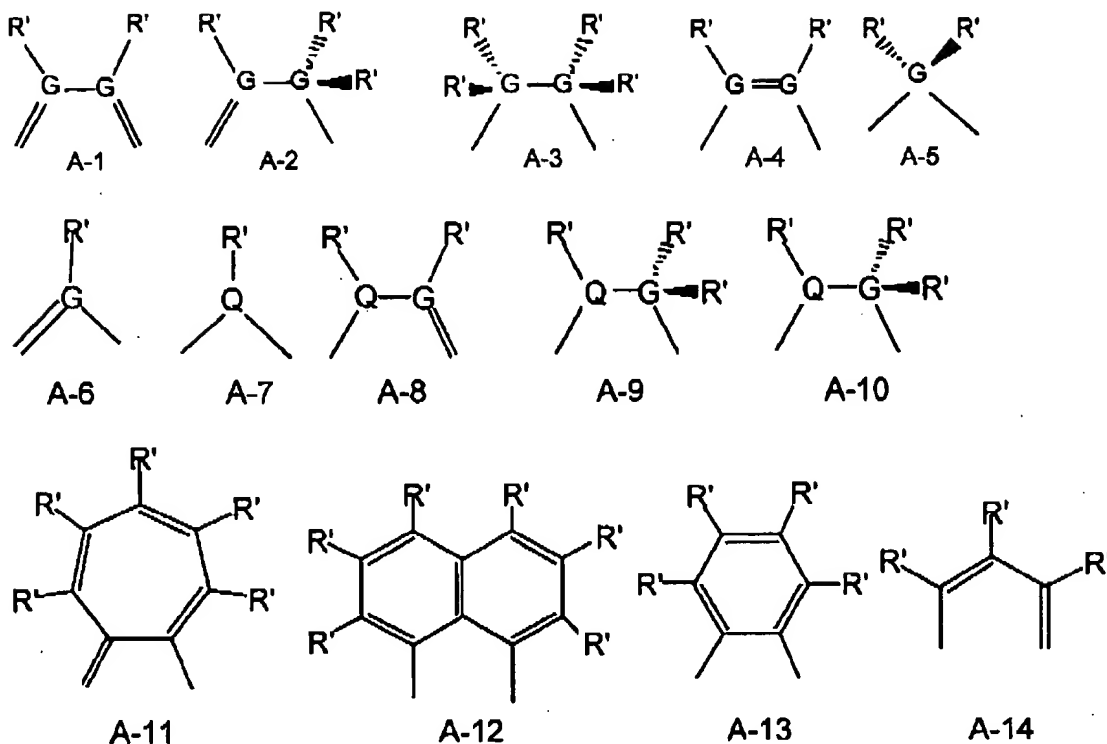


wherein:

- ~~A is a bridging group containing a Group 13-15 element;~~
~~each E is independently a Group 15 or 16 element covalently bonded to M;~~
~~each R is independently a C₁-C₃₀ radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, or halocarbyl-substituted organometalloid,~~
~~m and n are independently 1 or 2 depending on the valency of E;~~

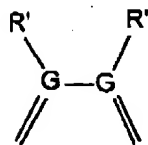
~~p is the charge on the bidentate ligand such that the overall charge of LMX is neutral.~~

52. (Previously Presented) The catalyst system of claim 51 wherein M is one or more of Ni, Pd, Pt, Cu or Co.
53. (Previously Presented) The catalyst system of claim 51 wherein the alumoxane comprises a modified alumoxane.
54. (Currently Amended) The catalyst ~~composition~~ system of claim 51 wherein the support comprises silica.
55. (Currently Amended) The catalyst ~~composition~~ system of claim 51 wherein the alumoxane comprises methylalumoxane.
56. (Previously Presented) The catalyst system of claim 51 wherein the alumoxane comprises modified methylalumoxane
57. (Previously Presented) The catalyst system of claim 51 wherein the alumoxane comprises an alkyl alumoxane.
58. (Previously Presented) The catalyst system of claim 51 wherein A has at least one conjugated group.
59. (Currently Amended) The catalyst system of claim ~~52~~ 51 wherein the transition metal catalyst compound-to-alumoxane molar ratio is from 1:500 to 10:1.
60. (Previously Presented) The catalyst system of claim 51 wherein M is nickel.
61. (Currently Amended) The catalyst system ~~compound~~ of claim 51 wherein A is defined by the following formulae:



wherein G is a Group 14 element—~~especially~~; Q is a Group 13 element; and R' are independently hydride radicals, C₁-C₃₀ hydrocarbyl radicals, substituted hydrocarbyl radicals, halocarbyl radicals, substituted halocarbyl radicals, ~~and~~ or hydrocarbyl- ~~and~~ or halocarbyl-substituted organometalloid radicals, and optionally two or more adjacent R' ~~may~~ form one or more C₄ to C₄₀ rings to give a saturated or unsaturated cyclic or polycyclic ring.

62. (Currently Amended) The catalyst ~~compound~~ system of claim 51 wherein M is nickel, E is nitrogen, m is 1, n is 1, p is 0, A is defined by the formula:



where each G is, independently, C, Si, or Ge, and each R' is a substituted phenyl group.

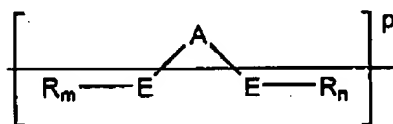
63. (Currently amended) The catalyst system of claim 13 wherein the system is essentially without residual solvent. ~~A catalyst composition, essentially without~~

~~residual solvent, comprising the combination of a transition metal compound, an activator and a support wherein the transition metal compound has the formula:~~



~~wherein~~

- ~~M is a group 9, 10 or 11 transition metal;~~
~~each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; a univalent anionic ligand; a neutral hydrocarbyl-containing donor ligand; a neutral non-hydrocarbyl atom-containing donor ligand; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from 2 to 20 carbon atoms; or two Xs are joined to form an anionic chelating ligand; and~~
~~r is 1, 2 or 3;~~
~~L is a bidentate ligand defined by the formula:~~



~~wherein:~~

- ~~A is a bridging group containing a Group 13-15 element;~~
~~each E is independently a Group 15 or 16 element covalently bonded to M;~~
~~each R is independently a C₁-C₂₀ radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, or halocarbyl-substituted organometalloid;~~
~~m and n are independently 1 or 2 depending on the valency of E;~~
~~p is the charge on the bidentate ligand such that the overall charge of LMX_r is neutral, and wherein the support is selected from the group consisting of Group 2, 3, 4, 5, 13, and 14 metal or metalloid oxides.~~

64. (Previously Presented) The catalyst system of claim 63 wherein the activator comprises a non-coordinating anion.

65. (Previously Presented) The catalyst system of claim 63 wherein the activator comprises an alumoxane.

66. (Currently Amended) The catalyst ~~composition~~ system of claim 63 wherein the support comprises silica.

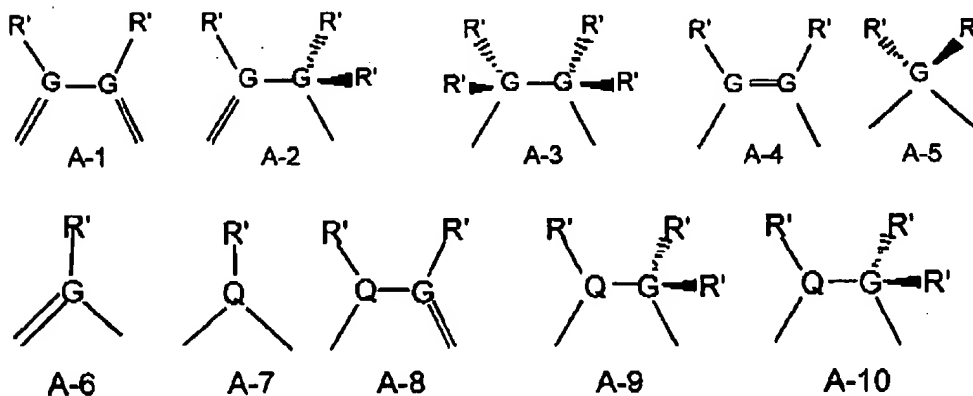
Claims 67- 69 cancelled.

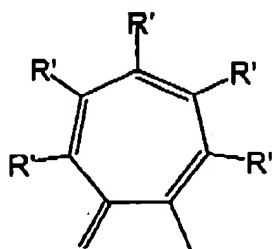
70. (Previously Presented) The catalyst system of claim 63 wherein A has at least one conjugated group.

71. (Currently Amended) The catalyst system of claim 65 wherein the transition metal catalyst ~~compound-to-alumoxane~~ molar ratio is from 1:500 to 10:1.

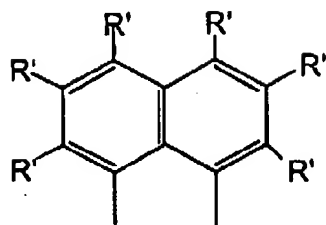
72. (Previously Presented) The catalyst system of claim 63 wherein M is nickel.

73. (Currently Amended) The catalyst ~~compound~~ system of claim 63 wherein A is defined by the following formulae:

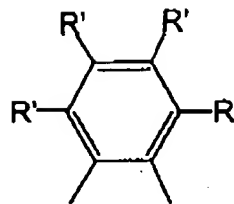




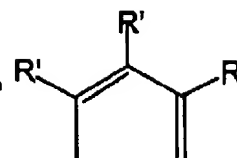
A-11



A-12



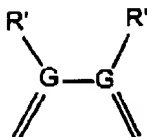
A-13



A-14

wherein G is a Group 14 element ~~especially~~; Q is a Group 13 element; and R' are independently hydride radicals, C₁-C₃₀ hydrocarbyl radicals, substituted hydrocarbyl radicals, halocarbyl radicals, substituted halocarbyl radicals, ~~and or~~ hydrocarbyl- ~~and or~~ halocarbyl-substituted organometalloid radicals, and optionally two or more adjacent R' ~~may~~ form one or more C₄ to C₄₀ rings to give a saturated or unsaturated cyclic or polycyclic ring.

74. (Currently Amended) The catalyst ~~compound~~ system of claim 63 wherein M is nickel, E is nitrogen, m is 1, n is 1, p is 0, A is defined by the formula:



where each G is, independently, C, Si, or Ge, and each R' is a substituted phenyl group.

Claims 75 to 98 cancelled.

99100. (Currently Amended) A catalyst system comprising the combination of the catalyst compound of claim ~~43~~ 13 and tetrakis(perfluorophenyl)boron.

100101. Cancelled.

101102. Cancelled.

102103. Cancelled.

103104. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the activator comprises a Group 13, 14, or 16 halide salt.

104105. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the activator comprises a group 15 oxyfluoride salt.

105106. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the activator comprises BF_4^- , PF_6^- , TeOF_6^- and/or ASF_6^- .

106107. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support comprises a non-coordinating anion chemically bound to the support.

107108. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support comprises a polymeric support.

108109. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support comprises one or more Group 2, 3, 4, 5, 13, or 14 metal or metalloid oxides.

109110. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support comprises one or more of magnesia, titania, or zirconia.

110111. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support has a pore size of from 10 to 1000 Å.


111112. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support has a surface area of 10-700 m²/g.

112113. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support has a pore volume of 0.1 to 4 cc/g.

113114. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support has an average particle size of 10-500 μ m.

114115. (Currently Amended) ~~The process of claim 95~~ The catalyst system of claim 13 wherein the support has:

- a) a surface area of 50 to 500 m²/g;
- b) a pore volume of 0.5 to 3.5 cc/g;
- c) an average particle size of 20 to 200 μ m; and
- d) a pore size of 50 to 500 \AA .

 115116. (Currently Amended) ~~The process catalyst system of claim 95~~ 114 wherein the transition metal compound is present on the support at a loading of 10-100 μ m of transition metal compound per gram of support.

116117. (Currently Amended) ~~The process catalyst system of claim 116~~ 115 wherein the loading is 20 to 80 μ moles transition metal compound per gram of support.

117118. (Currently Amended) ~~The process catalyst system of claim 116~~ 115 wherein the loading is 40 to 60 μ moles of transition metal compound per gram of support.

118119. Cancelled.

119120. Cancelled.

120121. Cancelled.

REMARKS

Reconsideration of the present claims, in light of the attached claim amendments and the remarks which follow, is respectfully requested.